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EXAMINER	
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ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/884,528	Applicant(s) WASYNCZUK ET AL.
	Examiner Ayal I Sharon	Art Unit 2123

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 June 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *8/27/2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7/16/02*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Introduction

1. Claims 1-28 of U.S. Application 09/884,528 filed on 6/19/2001 are presented for examination. The application claims priority to provisional application 60/212,695, filed on 6/19/2000.

Information Disclosure Statement

2. The information disclosure statement filed 8/27/2001 fails to comply with 37 CFR 1.98(a)(1), which requires a list of all patents, publications, or other information submitted for consideration by the Office. The text of the IDS makes reference to an attached PTO Form 1449A (modified), however, the form does not appear in the scanned version of the case. Examiner requests another copy of the form, and apologizes for the inconvenience to the Applicants.
3. The IDS has been placed in the application file, but the information referred to therein has not been considered.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 1-8 are rejected under 35 U.S.C. 101 because the claimed invention is not supported by either a specific and substantial asserted utility or a well established utility. The system claimed in independent claim 1 has no defined output, and therefore it does not have an output with a specific and substantial asserted utility or a well established utility. None of the dependent claims 2-8 rectify this defect.
6. Claims 9-26 are rejected under 35 U.S.C. 101 because the claimed invention is not supported by either a specific and substantial asserted utility or a well established utility. The method claimed in independent claim 9 claims "a method for simulating operation of a physical system having a plurality of subsystems", however, neither the claim nor the specification provide a specific and substantial or a well established utility for the claimed inventions. None of the dependent claims 10-26 rectify this defect.
7. Claims 27-28 are rejected under 35 U.S.C. 101 because the claimed invention is not supported by either a specific and substantial asserted utility or a well established utility. The system claimed in independent claim 27 has no defined output, and therefore it does not have an output with a specific and substantial asserted utility or a well established utility. Dependent claim 28 does not rectify this defect.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims 1-28 are also rejected under 35 U.S.C. 112, first paragraph. Specifically, since the claimed invention is not supported by either a specific and substantial asserted utility or a well established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 12-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Dependent claim 12 claim contains the limitation “wherein *n* is at least two”, and dependent claim 13 contains the limitation “wherein *n* is at least four”, while the independent claim 9 refers to “*n* state-related variables” and “… the value of at least one of the *n* state variables …”.

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim

indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949).

In the present instance, claim 12 recites the broad recitation "at least one of the *n* state variables", and the claim also recites "wherein *n* is at least two" which is the narrower statement of the range/limitation. Claims 13-18, which depend from claim 12, all inherit this defect.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

12. The prior art used for these rejections is as follows:

13. Fujimoto, R. "Parallel and Distributed Simulation". Proc. 31st Winter Simulation Conference. Dec. 1999. vol.1, pp.122-131. (Henceforth referred to as "**Fujimoto**").

14. The claim rejections are hereby summarized for Applicant's convenience. The detailed rejections follow.

15. Claims 9 and 12-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Fujimoto.

16. In regards to Claim 9,

> 9. A method for simulating operation of a physical system having a plurality of physical subsystems, comprising:
>
> simulating a first physical subsystem',
>
> accepting a request for export of information relating to *n* state-related variables that characterize the state of the first physical subsystem in said simulating',
>
> sending a first series of state-related messages, each message containing information relating to the value of at least one of the *n* state variables; and
>
> simulating a second physical subsystem; wherein:
>
> the request is made in conjunction with said simulating a second physical subsystem;
>
> the first physical subsystem interacts with the second physical subsystem; and
>
> the at least one state variable characterizes at least a portion of the interaction between the first physical subsystem and the second physical subsystem.

Fujimoto teaches (p.123 and pp.127-128):

> "... This lead to the creation of a set of standards for interconnecting simulators known as the Distributed Interactive Simulation (DIS) standards (IEEE Std. 1278.1-1995). DIS has since been replaced by the aforementioned High Level Architecture [HLA] that broadened this DIS approach to include analytic solutions." (p.123, "2. Analytic Simulations and Virtual Environments").

> "From a model execution standpoint, a DIS exercise can be viewed as a collection of autonomous virtual (manned training simulators), live (physical equipment), and constructive (war-gaming simulators and other analytic tools) simulators, each generating its own representation of the battlefield from its own perspective. Each simulator sends messages, called *protocol data units (PDUs)*, whenever its state changes in a way that might affect another simulator. Typical PDUs include movement to a new location, firing at another simulated entity, changes in its appearance to other simulators (such as rotating the turret of a tank), etc.
>
> In order to achieve interoperability among separately developed simulators, a set of standards have been developed (IEEE Std. 1278.1-1995). The standards specify the format and contents of PDUs exchanged between simulators as well as when PDUs should be sent." (pp.127-128, "5. Distributed Virtual Environments").

17. In regards to Claim 12,

> 12. The method of claim 9, wherein n is at least two.

Fujimoto teaches (pp.127-128), emphasis added:

> ""From a model execution standpoint, a DIS exercise can be viewed <u>as a collection of autonomous virtual (manned training simulators), live (physical equipment), and constructive (war-gaming simulators and other analytic tools) simulators, each generating its own representation of the battlefield from its own perspective</u> .... Each simulator sends messages, called *protocol data units (PDUs),* whenever its state changes in a way that might affect another simulator. Typical PDUs include movement to a new location, firing at another simulated entity, changes in its appearance to other simulators (such as rotating the turret of a tank), etc."

Examiner finds it to be inherent that at least two autonomous virtual, live or constructive simulators are connected a DIS exercise, and therefore *n* is at least two.

18. In regards to Claim 13,

> 13. The method of claim 12, wherein n is at least four.

Fujimoto teaches (pp.127-128):

> ""From a model execution standpoint, a DIS exercise can be viewed as a collection of autonomous virtual (manned training simulators), live (physical equipment), and constructive (war-gaming simulators and other analytic tools) simulators, each generating its own representation of the battlefield from its own perspective .... Each simulator sends messages, called *protocol data units (PDUs),* whenever its state changes in a way that might affect another simulator. Typical PDUs include movement to a new location, firing at another simulated entity, changes in its appearance to other simulators (such as rotating the turret of a tank), etc."

Examiner finds it to be inherent that at least two autonomous virtual, live or constructive simulators are connected a DIS exercise, and therefore *n* is at least two. Restricting *n* to being four or more is a matter of design choice.

19. In regards to Claim 14,

> 14. The method of claim 12, wherein at least one message in the first series of state-related messages contains information relating to the values of each of the n state variables.

Fujimoto teaches (p.123 and pp.127-128), emphasis added:

> ""From a model execution standpoint, a DIS exercise can be viewed as a collection of autonomous virtual (manned training simulators), live (physical equipment), and constructive (war-gaming simulators and other analytic tools) simulators, each generating its own representation of the battlefield from its own perspective .... Each simulator sends messages, called *protocol data units (PDUs),* whenever its state changes in a way that might affect another simulator. <u>Typical PDUs include movement to a new location, firing at another simulated entity, changes in its appearance to other simulators (such as rotating the turret of a tank), etc</u>."

20. In regards to Claim 15,

> 15. The method of claim 12, wherein at least one message in the first series of state-related messages contains information relating to the values of a first proper subset of the set containing all n state variables.

Fujimoto teaches (p.123 and pp.127-128), emphasis added:

> ""From a model execution standpoint, a DIS exercise can be viewed as a collection of autonomous virtual (manned training simulators), live (physical equipment), and constructive (war-gaming simulators and other analytic tools) simulators, each generating its own representation of the battlefield from its own perspective .... Each simulator sends messages, called *protocol data units (PDUs),* whenever its state changes in a way that might affect another simulator. <u>Typical PDUs include movement to a new location, firing at another simulated entity, changes in its appearance to other simulators (such as rotating the turret of a tank), etc</u>."

21. In regards to Claim 16,

> 16. The method of claim 15, further comprising sending a third series of state-related messages, wherein:
> at least one message in the third series of state-related messages contains information relating to the values of a second proper subset of the set containing all n state variables, and the second proper subset is different from the first proper subset.

Fujimoto teaches (p.128):

> ""*Transmission of 'ground truth' information*" Each node sends absolute truth about the state of the entities it represents."

Examiner finds that this corresponds to the claimed limitation in a scenario of 3 or more nodes.

22. In regards to Claim 17,

> 17. The method of claim 16, wherein:
> the messages in the first series of state-related messages are sampled at a first rate in simulation time in the first model;
> the messages in the third series of state-related messages are sampled at a second rate in simulation time in the first model; and
> the first rate and the second rate are not equal.

Fujimoto teaches (p.128):

> ""*Transmission of state change information only*" ... If a vehicle continues to 'do the same thing' (e.g., travel in a straight line with constant velocity), the rate at which state upgrades are transmitted is reduced."

Examiner therefore finds that Fujimoto teaches different sampling rates in different simulations.

23. In regards to Claim 18,

> 18. The method of claim 16, wherein:
> the messages in the first series of state-related messages are sampled at a first rate in simulation time in the first model;
> the messages in the third series of state-related messages are sampled at a second rate in simulation time in the first model; and
> the first rate and the second rate are equal.

Fujimoto teaches (p.128):

> ""*Transmission of state change information only*" ...Simulators do transmit 'keep alive' messages, e.g., every five seconds, so new simulators entering the exercise can include them in their virtual environment."

Examiner therefore finds that Fujimoto teaches equal sampling rates in different simulations.

24. In regards to Claim 19,

> 19. The method of claim 9, wherein:
> a given process makes the request; and
> said sending directs the first series of state-related messages to a process different from the given process.

Fujimoto teaches (p.128):

> "*Autonomy of Simulation nodes.* ... PDUs are broadcast to all simulators and the receiver must determine those that are relevant to its own virtual environment."

Claim Rejections - 35 USC § 103

25. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

26. The prior art used for these rejections is as follows:

27. Fujimoto, R. "Parallel and Distributed Simulation". Proc. 31st Winter Simulation Conference. Dec. 1999. vol.1, pp.122-131. (Henceforth referred to as "**Fujimoto**").

28. Defense Modeling and Simulation Office (DMSO), "Facility for Distributed Simulation Systems: Proposed Request for Comments". Version 1.2. June 1998. Chapters 1, 8. (Henceforth referred to as "**DMSO Facility reference**").

29. Defense Modeling and Simulation Office (DMSO), "High Level Architecture". Last updated on Sept. 13, 2004. (Henceforth referred to as "**the DMSO HLA page**").

30. The claim rejections are hereby summarized for Applicant's convenience. The detailed rejections follow.

31. Claims 1-8, 10-11, 20-21, and 25-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujimoto in view of DMSO Facility reference and further in view of the DMSO HLA page.

32. In regards to Claim 1,

> 1. A system, comprising:
>
> a first executing process that:
>
> > implements a first model to simulate a first subsystem, the first model being programmed in a first language and having a first state variable; and
> >
> > sends a first series of state-related messages, each message reflecting information relating to the value of the first state variable at a different point t_m in simulation time in the first model; and
>
> a second executing process that:
>
> > receives said first series of state-related messages; and
> >
> > implements a second model to simulate a second subsystem, the second model being programmed in a second language and taking as an input the value of the first state variable from said first series of state-related messages.

Fujimoto teaches (p.123 and pp.127-128):

> "... This lead to the creation of a set of standards for interconnecting simulators known as the Distributed Interactive Simulation (DIS) standards (IEEE Std. 1278.1-1995). DIS has since been replaced by the aforementioned High Level Architecture [HLA] that broadened this DIS approach to include analytic solutions." (p.123, "2. Analytic Simulations and Virtual Environments").
>
> "From a model execution standpoint, a DIS exercise can be viewed as a collection of autonomous virtual (manned training simulators), live (physical equipment), and constructive (war-gaming simulators and other analytic tools) simulators, each generating its own representation of the battlefield from its own perspective. Each simulator sends messages, called *protocol data units (PDUs),* whenever its state changes in a way that might affect another simulator. Typical PDUs include movement to a new location, firing at another simulated entity, changes in its appearance to other simulators (such as rotating the turret of a tank), etc.
>
> In order to achieve interoperability among separately developed simulators, a set of standards have been developed (IEEE Std. 1278.1-

1995). The standards specify the format and contents of PDUs exchanged between simulators as well as when PDUs should be sent." (pp.127-128, "5. Distributed Virtual Environments").

While Fujimoto teaches the "... interoperability among separately developed simulators..." in the above cited text, Fujimoto does not expressly teach that the first and second models are programmed in different programming languages.

The DMSO Facility reference, on the other hand, expressly teaches the use of CORBA (Common Object Request Broker Architecture) and CORBAServices (see pp.16-17). It is well known in the art that "a CORBA-based program from any vendor, on almost any computer, operating system, programming language, and network, can interoperate with a CORBA-based program from the same or another vendor, on almost any other computer, operating system, programming language, and network." (See CORBA® BASICS, "What Is CORBA? What does it do?", ©1997-2004.)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Fujimoto with those of the DMSO Facility reference, because Fujimoto expressly teaches the use of the High Level Architecture Standard (HLA), and the DMSO HLA page expressly teaches that "The HLA [standard] was adopted as the Facility for Distributed Simulation Systems 1.0 by the Object Management Group (OMG) in November 1998 and updated in 2001 ...". In other words, the DMSO HLA page teaches that the HLA standard corresponds to the teachings of the DMSO Facility reference.

33. In regards to Claim 2,

> 2. The system of claim 1, wherein:
>
> the second model has a second state variable;
>
> said second process further sends a second series of state-related messages, each message reflecting information relating to the value of the second state variable at a different point t_n in simulation time in the first model;
>
> said first process further receives said second series of state-related messages; and
>
> the first model takes as an input the value of the second state variable from said second series of state-related messages.

Fujimoto teaches (p.123 and pp.127-128), emphasis added:

> ""From a model execution standpoint, a DIS exercise can be viewed as a collection of autonomous virtual (manned training simulators), live (physical equipment), and constructive (war-gaming simulators and other analytic tools) simulators, each generating its own representation of the battlefield from its own perspective .... Each simulator sends messages, called *protocol data units (PDUs),* whenever its state changes in a way that might affect another simulator. <u>Typical PDUs include movement to a new location, firing at another simulated entity, changes in its appearance to other simulators (such as rotating the turret of a tank), etc</u>."

Fujimoto also teaches (p.128):

> ""*Transmission of 'ground truth' information*" Each node sends absolute truth about the state of the entities it represents. If a vehicle continues to 'do the same thing' (e.g., travel in a straight line with constant velocity), the rate at which state upgrades are transmitted is reduced. Simulators do transmit 'keep alive' messages, e.g., every five seconds, so new simulators entering the exercise can include them in their virtual environment."

Fujimoto also teaches (p.128):

> "*Autonomy of Simulation nodes.* ... PDUs are broadcast to all simulators and the receiver must determine those that are relevant to its own virtual environment."

34. In regards to Claim 3,

> 3. The system of claim 2, wherein for at least a first message in said first series of

> state-related messages, said first message reflecting information relating to the value of the first state variable at point t_1 in simulation time in the first model, there is a second message in said second series of state-related messages that reflects the value of the second state variable at point t_1 in simulation time in the first model.

Fujimoto also teaches (p.128):

> ""*Transmission of 'ground truth' information*" Each node sends absolute truth about the state of the entities it represents.

Examiner interprets therefore that different nodes can simultaneously send state information about the status of different entities at point t_1 in simulation time in the first model.

35. In regards to Claim 4,

> 4. The system of claim 2, wherein for at least a first message in a series of state-related messages, said first message reflecting the value of the first state variable at point t_1 in simulation time, there is no second message in said second series of state-related messages that reflects the value of the second state variable at point t_1 in simulation time.

Fujimoto also teaches (p.128):

> ""*Transmission of 'ground truth' information*" ... If a vehicle continues to 'do the same thing' (e.g., travel in a straight line with constant velocity), the rate at which state upgrades are transmitted is reduced.

Examiner interprets therefore that Fujimoto teaches that one node can decide to not send state information about the status of an entity at point t_1 in simulation time in the first model based on that entity "doing the same thing".

36. In regards to Claim 5,

> 5. The system of claim 1, wherein;
> said first series of state-related messages comprises
> a first message reflecting information relating to the value of the first state variable at time *t1* in simulation time in the first model;
> a second message reflecting information relating to the value of the first state variable at time *t2* in simulation time in the first model; and
> a third message reflecting information relating to the value of the first state variable at time *t3* in simulation time in the first model; and
> wherein the first message, second message, and third message are consecutive within said first series of state-related messages; and *t2-t1* = *t3-t2*.

Fujimoto also teaches (p.128):

> ""*Transmission of 'ground truth' information*" ... If a vehicle continues to 'do the same thing' (e.g., travel in a straight line with constant velocity), the rate at which state upgrades are transmitted is reduced.

The phrase "...rate at which upgrades are transmitted ..." implies a constant rate of transmission, a constant periodic intervals, which corresponds to the claimed limitations.

37. In regards to Claim 6,

> 6. The system of claim 1, wherein;
> said first series of state-related messages comprises
> a first message reflecting information relating to the value of the first state variable at time *t1* in simulation time in the first model;
> a second message reflecting information relating to the value of the first state variable at time *t2* in simulation time in the first model; and
> a third message reflecting information relating to the value of the first state variable at time *t3* in simulation time in the first model; and
> wherein the first message, second message, and third message are consecutive within said first series of state-related messages; and *t2-t1 is not equal to t3-t2*.

Fujimoto also teaches (p.128):

> ""*Transmission of 'ground truth' information*" ... If a vehicle continues to 'do the same thing' (e.g., travel in a straight line with constant velocity), the rate at which state upgrades are transmitted is reduced.

The phrase "...rate at which upgrades are transmitted is reduced ..." implies a change in the rate of transmission, (i.e., the periodic intervals), which corresponds to the claimed limitations.

38. In regards to Claim 7,

> 7. The system of claim 1, wherein:
> said first set of programming instructions exposes a first interface for the first model, where said first interface:
>
> prevents access by said second set of programming instructions to a first substantial portion of the first model, and
>
> allows access by said second set of programming instructions to a second

substantial portion of the first model; and

said second set of programming instructions exposes a second interface for the second model, where said second interface:

prevents access by said first set of programming instructions to a first substantial portion of the second model, and

allows access by said first set of programming instructions to a second substantial portion of the second model.

Fujimoto also teaches (p.128):

> "*Autonomy of Simulation nodes.* ... PDUs are broadcast to all simulators and the receiver must determine those that are relevant to its own virtual environment."

Examiner interprets that therefore each simulator selective receives PDUs received from other simulators, and this reads upon the claimed limitations.

39. In regards to Claim 8,

> 8. The system of claim 1, wherein
> the first model has a third state variable;
> each message in said first series of state-related messages further reflects information relating to the value of the third state variable at point tm in simulation time; and
> the second model also takes the third state variable as an input from said first series of state-related messages.

Fujimoto also teaches (p.128):

> "*Autonomy of Simulation nodes.* ... PDUs are broadcast to all simulators and the receiver must determine those that are relevant to its own virtual environment."

Examiner interprets that therefore each simulator selective receives PDUs received from other simulators, and this reads upon the claimed limitations.

40. In regards to Claim 10,

> 10. The method of claim 9, wherein:
> said simulating a first physical subsystem is performed on a first processor, and
> said simulating a second physical subsystem is performed on the first processor.

Fujimoto teaches (p.123 and pp.127-128):

> "... This lead to the creation of a set of standards for interconnecting simulators known as the Distributed Interactive Simulation (DIS) standards (IEEE Std. 1278.1-1995). DIS has since been replaced by the aforementioned High Level Architecture [HLA] that broadened this DIS approach to include analytic solutions." (p.123, "2. Analytic Simulations and Virtual Environments").
>
> "From a model execution standpoint, a DIS exercise can be viewed as a collection of autonomous virtual (manned training simulators), live (physical equipment), and constructive (war-gaming simulators and other analytic tools) simulators, each generating its own representation of the battlefield from its own perspective. Each simulator sends messages, called *protocol data units (PDUs),* whenever its state changes in a way that might affect another simulator. Typical PDUs include movement to a new location, firing at another simulated entity, changes in its appearance to other simulators (such as rotating the turret of a tank), etc.
>
> In order to achieve interoperability among separately developed simulators, a set of standards have been developed (IEEE Std. 1278.1-1995). The standards specify the format and contents of PDUs exchanged between simulators as well as when PDUs should be sent." (pp.127-128, "5. Distributed Virtual Environments").

While Fujimoto teaches the "... interoperability among separately developed simulators..." in the above cited text, Fujimoto does not expressly teach that the first and second models run on the same processor.

The DMSO Facility reference, on the other hand, expressly teaches the use of CORBA (Common Object Request Broker Architecture) and CORBAServices (see pp.16-17). It is well known in the art that "a CORBA-based program from any vendor, on almost any computer, operating system, programming language, and network, can interoperate with a CORBA-based program from the same or another vendor, on almost any other computer, operating system, programming language, and network." (See CORBA® BASICS, "What Is CORBA? What does it do?", ©1997-2004.)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Fujimoto with those of the DMSO Facility reference, because Fujimoto expressly teaches the use of the High Level Architecture Standard (HLA), and the DMSO HLA page expressly teaches that "The HLA [standard] was adopted as the Facility for Distributed Simulation Systems 1.0 by the Object Management Group (OMG) in November 1998 and updated in 2001 …". In other words, the DMSO HLA page teaches that the HLA standard corresponds to the teachings of the DMSO Facility reference.

41. In regards to Claim 11,

> 11. The method of claim 9, wherein;
> said simulating a first physical subsystem is performed on a first processor, and
> said simulating a second physical subsystem is performed on a second processor.

Fujimoto teaches (p.123 and pp.127-128):

> "… This lead to the creation of a set of standards for interconnecting simulators known as the Distributed Interactive Simulation (DIS) standards (IEEE Std. 1278.1-1995). DIS has since been replaced by the aforementioned High Level Architecture [HLA] that broadened this DIS approach to include analytic solutions." (p.123, "2. Analytic Simulations and Virtual Environments").
>
> "From a model execution standpoint, a DIS exercise can be viewed as a collection of autonomous virtual (manned training simulators), live (physical equipment), and constructive (war-gaming simulators and other analytic tools) simulators, each generating its own representation of the battlefield from its own perspective. Each simulator sends messages, called *protocol data units (PDUs),* whenever its state changes in a way that might affect another simulator. Typical PDUs include movement to a new location, firing at another simulated entity, changes in its appearance to other simulators (such as rotating the turret of a tank), etc.
>
> In order to achieve interoperability among separately developed simulators, a set of standards have been developed (IEEE Std. 1278.1-1995). The standards specify the format and contents of PDUs exchanged between simulators as well as when PDUs should be sent." (pp.127-128, "5. Distributed Virtual Environments").

While Fujimoto teaches the "... interoperability among separately developed simulators..." in the above cited text, Fujimoto does not expressly teach that the first and second models run on different processors.

The DMSO Facility reference, on the other hand, expressly teaches the use of CORBA (Common Object Request Broker Architecture) and CORBAServices (see pp.16-17). It is well known in the art that "a CORBA-based program from any vendor, on almost any computer, operating system, programming language, and network, can interoperate with a CORBA-based program from the same or another vendor, on almost any other computer, operating system, programming language, and network." (See CORBA® BASICS, "What Is CORBA? What does it do?", ©1997-2004.)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Fujimoto with those of the DMSO Facility reference, because Fujimoto expressly teaches the use of the High Level Architecture Standard (HLA), and the DMSO HLA page expressly teaches that "The HLA [standard] was adopted as the Facility for Distributed Simulation Systems 1.0 by the Object Management Group (OMG) in November 1998 and updated in 2001 ...". In other words, the DMSO HLA page teaches that the HLA standard corresponds to the teachings of the DMSO Facility reference.

42. In regards to Claim 20,

> 20. The method of claim 9, further comprising;
> receiving the first series of state-related messages in a first output process in communication with a first output device; and

sending to the first output device a first set of information carried by a plurality of messages in the first series of state-related messages; and
wherein the first output device is in communication with the first output process.

Fujimoto teaches (pp.127-128, "5. Distributed Virtual Environments"):

"From a model execution standpoint, a DIS exercise can be viewed as a collection of autonomous virtual (manned training simulators), live (physical equipment), and constructive (war-gaming simulators and other analytic tools) simulators, each generating its own representation of the battlefield from its own perspective. Each simulator sends messages, called *protocol data units (PDUs),* whenever its state changes in a way that might affect another simulator. Typical PDUs include movement to a new location, firing at another simulated entity, changes in its appearance to other simulators (such as rotating the turret of a tank), etc.

In order to achieve interoperability among separately developed simulators, a set of standards have been developed (IEEE Std. 1278.1-1995). The standards specify the format and contents of PDUs exchanged between simulators as well as when PDUs should be sent.".

Examiner finds that a video monitors in "virtual (manned training simulators)", "live (physical equipment)" [or] "constructive (war-gaming simulators and other analytic tools) simulators" correspond to the claimed "output device", and that the process of displaying the output data on the output device corresponds to the claimed "sending to the first output device a first set of information".

43. In regards to Claim 21,

21. The method of claim 20, wherein the first output device is a monitor.

Fujimoto teaches (pp.127-128, "5. Distributed Virtual Environments"):

"From a model execution standpoint, a DIS exercise can be viewed as a collection of autonomous virtual (manned training simulators), live (physical equipment), and constructive (war-gaming simulators and other analytic tools) simulators, each generating its own representation of the battlefield from its own perspective. Each simulator sends messages, called *protocol data units (PDUs),* whenever its state changes in a way that might affect another simulator. Typical PDUs include movement to a new location, firing at another simulated entity, changes in its appearance to other simulators (such as rotating the turret of a tank), etc.

> In order to achieve interoperability among separately developed simulators, a set of standards have been developed (IEEE Std. 1278.1-1995). The standards specify the format and contents of PDUs exchanged between simulators as well as when PDUs should be sent.".

Examiner finds that a video monitors in "virtual (manned training simulators)", "live (physical equipment)" [or] "constructive (war-gaming simulators and other analytic tools) simulators" correspond to the claimed "output device", and that the process of displaying the output data on the output device corresponds to the claimed "sending to the first output device a first set of information".

44. In regards to Claim 25,

> 25. The method of claim 20, further comprising:
> receiving a second series of state-related messages in the first output process; and
> sending to the first output device a second set of information carried by a plurality of messages in the second series of state-related messages; and
> wherein said sending steps comprise outputting time information associating the first set of information and the second set of information with a system time.

Fujimoto does not expressly teaches the use of a "... set of information with a system time ...".

The DMSO Facility reference, on the other hand, expressly teaches the use of timestamps in "TSO messages". (see pp.136-137, Section 8.1.1. Messages).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Fujimoto with those of the DMSO Facility reference, because Fujimoto expressly teaches the use of the High Level Architecture Standard (HLA), and the DMSO HLA page expressly teaches that "The HLA [standard] was adopted as the Facility for Distributed Simulation Systems 1.0 by the Object Management Group (OMG) in November 1998 and

updated in 2001 …". In other words, the DMSO HLA page teaches that the HLA standard corresponds to the teachings of the DMSO Facility reference.

45. In regards to Claim 26,

> 26. The method of claim 20, further comprising:
> receiving a second series of state-related messages in a second output process, which is in communication with a second output device; and
> outputting to the second output device a second set of information carried by a plurality of messages in the second series of state-related messages;
> wherein said sending comprises associating the first set of information with a system time; and said outputting comprises associating the second set of information with the system time.

Fujimoto does not expressly teaches the use of a "… set of information with a system time …".

The DMSO Facility reference, on the other hand, expressly teaches the use of timestamps in "TSO messages". (see pp.136-137, Section 8.1.1. Messages).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Fujimoto with those of the DMSO Facility reference, because Fujimoto expressly teaches the use of the High Level Architecture Standard (HLA), and the DMSO HLA page expressly teaches that "The HLA [standard] was adopted as the Facility for Distributed Simulation Systems 1.0 by the Object Management Group (OMG) in November 1998 and updated in 2001 …". In other words, the DMSO HLA page teaches that the HLA standard corresponds to the teachings of the DMSO Facility reference.

46. In regards to Claim 27,

27. A system, comptising:
a first computer-readable medium encoded with programming instmctions executable in

a first process to:
implement a first simulation model;
accept a first command signal; and
manage the first simulation model based on the first command signal;

a second computer-readable medium encoded with a second set of programming instructions executable in a second process to;
implement a second simulation model;
accept a second command signal', and
manage the second simulation model based on the second command signal; and

a third computer-readable medium encoded with a third set of propamming instructions executable in a third process to:
send the first command signal to said first process; and
send the second command signal to said second process.

Fujimoto teaches (p.123 and pp.127-128):

"... This lead to the creation of a set of standards for interconnecting simulators known as the Distributed Interactive Simulation (DIS) standards (IEEE Std. 1278.1-1995). DIS has since been replaced by the aforementioned High Level Architecture [HLA] that broadened this DIS approach to include analytic solutions." (p.123, "2. Analytic Simulations and Virtual Environments").

"From a model execution standpoint, a DIS exercise can be viewed as a collection of autonomous virtual (manned training simulators), live (physical equipment), and constructive (war-gaming simulators and other analytic tools) simulators, each generating its own representation of the battlefield from its own perspective. Each simulator sends messages, called *protocol data units (PDUs),* whenever its state changes in a way that might affect another simulator. Typical PDUs include movement to a new location, firing at another simulated entity, changes in its appearance to other simulators (such as rotating the turret of a tank), etc.

In order to achieve interoperability among separately developed simulators, a set of standards have been developed (IEEE Std. 1278.1-1995). The standards specify the format and contents of PDUs exchanged between simulators as well as when PDUs should be sent." (pp.127-128, "5. Distributed Virtual Environments").

While Fujimoto teaches the "... interoperability among separately developed simulators..." in the above cited text, Fujimoto does not expressly

teach that the first and second models are programmed in different programming languages.

The DMSO Facility reference, on the other hand, expressly teaches the use of CORBA (Common Object Request Broker Architecture) and CORBAServices (see pp.16-17). It is well known in the art that "a CORBA-based program from any vendor, on almost any computer, operating system, programming language, and network, can interoperate with a CORBA-based program from the same or another vendor, on almost any other computer, operating system, programming language, and network." (See CORBA® BASICS, "What Is CORBA? What does it Do?", ©1997-2004.)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Fujimoto with those of the DMSO Facility reference, because Fujimoto expressly teaches the use of the High Level Architecture Standard (HLA), and the DMSO HLA page expressly teaches that "The HLA [standard] was adopted as the Facility for Distributed Simulation Systems 1.0 by the Object Management Group (OMG) in November 1998 and updated in 2001 …". In other words, the DMSO HLA page teaches that the HLA standard corresponds to the teachings of the DMSO Facility reference.

47. In regards to Claim 28,

> 28. The system of claim 27, wherein said managing steps are synchronized to a common system time.

Fujimoto teaches (p.128):

> "*Autonomy of Simulation nodes.* … Each simulator advances simulation time according to a local real-time clock."

In addition, The DMSO Facility reference, on the other hand, expressly teaches the use of timestamps in "TSO messages". (see pp.136-137, Section 8.1.1. Messages).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Fujimoto with those of the DMSO Facility reference, because Fujimoto expressly teaches the use of the High Level Architecture Standard (HLA), and the DMSO HLA page expressly teaches that "The HLA [standard] was adopted as the Facility for Distributed Simulation Systems 1.0 by the Object Management Group (OMG) in November 1998 and updated in 2001 ...". In other words, the DMSO HLA page teaches that the HLA standard corresponds to the teachings of the DMSO Facility reference.

48. **Claims 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujimoto in view of DMSO Facility reference and further in view of the DMSO HLA page in further view of Official Notice.**

49. In regards to Claim 22,

> 22. The method of claim 20, wherein the first output device is a printer.

Fujimoto teaches (pp.127-128, "5. Distributed Virtual Environments"):

> "From a model execution standpoint, a DIS exercise can be viewed as a collection of autonomous virtual (manned training simulators), live (physical equipment), and constructive (war-gaming simulators and other analytic tools) simulators, each generating its own representation of the battlefield from its own perspective. Each simulator sends messages, called *protocol data units (PDUs),* whenever its state changes in a way that might affect another simulator. Typical PDUs include movement to a new location, firing at another simulated entity, changes in its appearance to other simulators (such as rotating the turret of a tank), etc.

> In order to achieve interoperability among separately developed simulators, a set of standards have been developed (IEEE Std. 1278.1-1995). The standards specify the format and contents of PDUs exchanged between simulators as well as when PDUs should be sent.".

Examiner finds that a video monitors in "virtual (manned training simulators)", "live (physical equipment)" [or] "constructive (war-gaming simulators and other analytic tools) simulators" correspond to the claimed "output device", and that the process of displaying the output data on the output device corresponds to the claimed "sending to the first output device a first set of information".

However, Fujimoto does not expressly teach the situation in which the first output device is a printer.

Official Notice is given that it is old and well known in the art to use printers as output devices.

Examiner finds that it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a printer as an output device, because this was well known in the art at that time.

50. In regards to Claim 23,

> 23. The method of claim 20, wherein the first output device stores the first set of information in a recordable medium.

Fujimoto teaches (pp.127-128, "5. Distributed Virtual Environments"):

> "From a model execution standpoint, a DIS exercise can be viewed as a collection of autonomous virtual (manned training simulators), live (physical equipment), and constructive (war-gaming simulators and other analytic tools) simulators, each generating its own representation of the battlefield from its own perspective. Each simulator sends messages, called *protocol data units (PDUs),* whenever its state changes in a way that might affect another simulator. Typical PDUs include movement to a new location, firing at another simulated entity, changes in its appearance to other simulators (such as rotating the turret of a tank), etc.

> In order to achieve interoperability among separately developed simulators, a set of standards have been developed (IEEE Std. 1278.1-1995). The standards specify the format and contents of PDUs exchanged between simulators as well as when PDUs should be sent.".

Examiner finds that a video monitors in "virtual (manned training simulators)", "live (physical equipment)" [or] "constructive (war-gaming simulators and other analytic tools) simulators" correspond to the claimed "output device", and that the process of displaying the output data on the output device corresponds to the claimed "sending to the first output device a first set of information".

However, Fujimoto does not expressly teach the situation in which the first output device is a printer.

Official Notice is given that it is old and well known in the art to store information in a recordable medium.

Examiner finds that it would have been obvious to one of ordinary skill in the art at the time the invention was made to store information in a recordable medium, because this was well known in the art at that time.

51. In regards to Claim 24,

> 24. The system of claim 20, wherein said displaying comprises graphing a function of the first state variable versus time.

Fujimoto teaches (pp.127-128, "5. Distributed Virtual Environments"):

> "From a model execution standpoint, a DIS exercise can be viewed as a collection of autonomous virtual (manned training simulators), live (physical equipment), and constructive (war-gaming simulators and other analytic tools) simulators, each generating its own representation of the battlefield from its own perspective. Each simulator sends messages, called *protocol data units (PDUs),* whenever its state changes in a way that might affect another simulator. Typical PDUs include movement to a

> new location, firing at another simulated entity, changes in its appearance to other simulators (such as rotating the turret of a tank), etc.
>
> In order to achieve interoperability among separately developed simulators, a set of standards have been developed (IEEE Std. 1278.1-1995). The standards specify the format and contents of PDUs exchanged between simulators as well as when PDUs should be sent.".

Examiner finds that a video monitors in "virtual (manned training simulators)", "live (physical equipment)" [or] "constructive (war-gaming simulators and other analytic tools) simulators" correspond to the claimed "output device", and that the process of displaying the output data on the output device corresponds to the claimed "sending to the first output device a first set of information".

However, Fujimoto does not expressly teach the situation in which the display comprises graphing a function of a variable versus time.

Official Notice is given that it is old and well known in the art to use graph variables versus time.

Examiner finds that it would have been obvious to one of ordinary skill in the art at the time the invention was made to use graph variables versus time, because this was well known in the art at that time.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ayal I. Sharon whose telephone number is (571) 272-3714. The examiner can normally be reached on Monday through Thursday, and the first Friday of a biweek, 8:30 am – 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin Teska can be reached at (571) 272-3716.

Any response to this office action should be faxed to (703) 872-9306 or mailed to:

Director of Patents and Trademarks
Washington, DC 20231

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Tech Center 2100 Receptionist, whose telephone number is (571) 272-2100.

Ayal I. Sharon
Art Unit 2123
November 12, 2004

KEVIN J. TESKA
SUPERVISORY
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